

FIRE AND *CUSCUTA GLOMERATA* CHOISY IN OHIO:  
A CONNECTION?

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ABSTRACT

*Cuscuta glomerata* Choisy is a distinctive species largely confined to the central and midwestern prairie region. It was noted as extirpated in Ohio in 1988 (the last collection dating from 1933). Since 1989 five stations for the species in Ohio have been located. All are associated with prairie remnants which have, in recent years, been subjected to regular controlled burning. It is suggested that fire is essential to rupture the seed coat and stimulate germination.

Key Words: *Cuscuta glomerata*, Ohio, prairie, fire

*Cuscuta glomerata* Choisy (Cuscutaceae), colloquially known as Rope-dodder (Gleason and Cronquist, 1991), is a distinctive species in a genus noted for difficulty in species separation (Austin, 1979). While some species are partly autophytic, many species lack chlorophyll and appear to be entirely parasitic. Rope-dodder is easily identified by its dense, elongate, continuous flower clusters which, when in flower, resemble a thick orange-colored pipe-cleaner twining among the vegetation (Figure 1). Other characters which separate *C. glomerata* from other eastern North American species are its capitate stigmas, distinct sepals, and sessile flowers subtended by several loosely ascending bracts with recurved tips. Rope-dodder exhibits a tendency to parasitize species of Asteraceae, such as *Ambrosia*, *Aster*, *Helenium*, *Helianthus*, *Liatris*, *Silphium*, *Solidago* and *Vernonia* (Yuncker, 1965). Members of these genera are commonly found in prairies, and the range of *C. glomerata* is largely confined to the central and midwestern prairie region (Fernald, 1950).

Fire is known to play an important role in prairie ecosystems by stimulating and maintaining populations of certain prairie species (Anderson, 1982). Historical accounts by early pioneers settling mid-western and central prairie regions report on the ferocity and frequency of these blazes (Brown, 1883). As prairies diminished in size and became increasingly fragmented with the advance of civilization, fire suppression became the norm and thus prairie fires were virtually eliminated (Curtis, 1959). In recent years natural-areas managers have begun to use fire as a tool for the management of prairie communities. In 1983, the Ohio De-



Figure 1. *Cuscuta glomerata* parasitizing *Solidago canadensis* in Milford Center Prairie, Union County, Ohio.

partment of Natural Resources (ODNR) began to experiment with controlled burning on state-owned prairie areas. Since that time ODNR's controlled burning activities have become a vital part of the state's natural areas management program. In the springs

Table 1. Correlation between burning history and discovery of Ohio *Cuscuta glomerata* populations.

County	Year Discovered	Fire History
Madison	1920	?
Pickaway	1930	?
Madison	1933	?
Logan	1989	1984, 1985, 1986, 1987, 1988, 1989
Logan	1989	*
Wyandot	1990	*
Union	1991	1987, 1988, 1989, 1990, 1991
Wyandot	1992	1992

\* Discussions with landowners revealed that these sites have been burned several times in the last decade, but they were unsure of which years.

of 1991 and 1992, ODNR conducted 17 prescribed burns on 10 prairies.

In Ohio, most of the prairie areas which existed prior to European settlement have been eliminated; only small, isolated fragments remain (Cusick and Troutman, 1978). Since natural forces such as fire no longer maintain these areas, prairie remnants in many cases have been further reduced by the invasion of non-native and woody species. This successional process and destruction of habitat has resulted in several prairie species being listed as extirpated in Ohio, such as *Besseya bullii* (Eaton) Rydb. (Kittentails), *Perideridia americana* (Nutt.) Reichb. (*Perideridia*), *Viola pedatifida* G. Don (Prairie Violet), *Dalea purpurea* Vent. (Purple Prairie-clover), and *Oenothera triloba* Nutt. (Stemless Evening-primrose). Other prairie plants are listed as endangered or threatened, including *Silphium laciniatum* L. (Compass-plant), *Gentiana puberulenta* J. Pringle (Prairie Gentian), *Valeriana ciliata* T. & G. (Prairie Valerian), *Baptisia lactea* (Raf.) Thieret (Prairie False Indigo), *Sporobolus heterolepis* A. Gray (Prairie Dropseed), *Platanthera leucophaea* (Nutt.) Lindl. (Prairie Fringed Orchid), and *Cypripedium candidum* Muhl. (White Lady's-slipper) (Division of Natural Areas and Preserves, 1992). *Cuscuta glomerata* was listed as extirpated in Ohio until 1988 (Division of Natural Areas and Preserves, 1988), as the last collection was from Madison County in 1933.

On August 12, 1989, the species was rediscovered in a prairie in Logan County (Peskin, 1990). Four other populations have since been located (Table 1). The first site, known as Liberty Fen

State Nature Preserve, was acquired by ODNR in 1981. The area of the preserve where the Dodder occurs has been subjected to spring burns annually since 1984. It is unlikely that *C. glomerata* was present prior to its discovery in 1989, except possibly in a dormant state. Rope-dodder is a conspicuous, easily detected species, and botanical research has been conducted at this site annually since ODNR assumed ownership. Approximately 75 plants were parasitized by the dodder, mostly *Helianthus grosseserratus* Martens (Sawtooth Sunflower), with a few *Solidago canadensis* L. (Canada Goldenrod) affected. Associates in this area include *Solidago uliginosa* Nutt. (Bog Goldenrod), *Aster puniceus* L. (Bristly Aster), *Carex trichocarpa* Muhl. (Hairy-fruited Sedge), *Physostegia virginiana* (L.) Benth. (Obedient-plant), *Solidago riddellii* Frank. (Riddell's Goldenrod), *Carex sartwellii* Dewey. (Sartwell's Sedge), and *Pedicularis lanceolata* Michx. (Swamp Lousewort).

On September 21, 1989, *C. glomerata* was located at another site in Logan County, also a moist prairie association bordering a fen. Approximately 100 host plants were infested with Rope-dodder, all of them *Solidago canadensis*. Other plant taxa in the vicinity of the dodder included *Agalinis tenuifolia* (M. Vahl.) Raf. (Common Agalinis), *Lobelia siphilitica* L. (Great Lobelia), *Che-lone glabra* L. (Turtlehead), *Solidago riddellii* and *Physostegia virginiana*.

On August 25, 1990, a third population of *C. glomerata* was discovered, at Killdeer Plains Wildlife Management Area in Wyandot County. Killdeer Plains is an 8,637-acre tract located in the former Sandusky Plains, a large wet prairie which covered much of Marion and Wyandot counties. Small prairie remnants still persist in and around the wildlife area, which is owned and managed by ODNR, Division of Wildlife (DOW). Large sections of Killdeer Plains are burned on a rotating basis, and DOW personnel indicated that the site where the Dodder grows has been burned several times in the last fifteen years. Approximately 150 plants of *Helianthus grosseserratus* were parasitized by Rope-dodder. Associate species include *Andropogon gerardi* Vitman (Big Bluestem), *Silphium terebinthinaceum* Jacq. (Prairie-dock), and *Liatris spicata* (L.) Willd. (Spiked Blazing-star).

The fourth modern population of *Cuscuta glomerata* was located on July 26, 1991, in Union County. This population occurs in the largest prairie remnant associated with the former Darby Plains, which covered ca. 385 square miles in west-central Ohio



Figure 2. Ohio distribution of *Cuscuta glomerata*. × = pre 1934. ○ = post 1988. ■ = original prairie areas of central Ohio. (Adapted from unpublished map by E. N. Transeau.)

(King, 1981). This site, known as Milford Center Prairie, is a narrow strip ca. 1.3 miles long on a power transmission line right-of-way owned by Dayton Power and Light. It is managed as a prairie preserve by ODNR, Division of Natural Areas and Preserves (DNAP). A number of rare or uncommon prairie plants persist here, including *Silene regia* Sims (Royal Catchfly), *Rosa blanda* Aiton (Smooth Rose), *Solidago rigida* L. (Stiff Goldenrod), *Melica nitens* Nutt. (Three-flowered Melic), and *Lathyrus venosus* Muhl. (Wild Pea). The Rope-dodder was found on approximately 30 host plants of two species, *Helianthus grosseserratus* and *Solidago canadensis*, in an area of the prairie regularly subjected to

fire. DNAP personnel have conducted spring burns at Milford Center Prairie annually since 1987. It seems unlikely that *C. glomerata* bloomed here in recent years, as this prairie is frequently visited by botanists, and is easy to examine due to its narrow width.

A fifth population of Rope-dodder was discovered on August 16, 1992, in a roadside prairie remnant near Killdeer Plains Wildlife Management Area in Wyandot County. About 75 plants of *Helianthus grosseserratus* were infested by dodder. This prairie is drier than the other *Cuscuta glomerata* sites, and associates include *Andropogon gerardi*, *Veronicastrum virginicum* (L.) Farw. (Culver's Root), *Spiraea alba* Duroi (Meadowsweet), *Ratibida pinnata* (Vent.) Barnhart (Prairie Coneflower), *Pycnanthemum virginianum* (L.) Durand & B. D. Jackson (Virginia Mountain-mint), *Silphium trifoliatum* L. (Whorled Rosin-weed), and *Monarda fistulosa* L. (Wild Bergamot). Many of the roadsides in this area are regularly burned in the spring by local farmers, and a check with the owner of this site revealed that it has been regularly burned in recent years, most recently in the spring of 1992.

Historical collections of *Cuscuta glomerata* in Ohio are known from three sites in two counties: Madison in 1920 and 1933, and Pickaway in 1930. No habitat information is included on the labels from these collections, but both of these counties lie within former large prairie areas (Figure 2). The Pickaway Plains area extended from three to seven miles across Pickaway County (Bradley 1835), but has been almost entirely destroyed. The Darby Plains included large areas of Madison County.

Prior to European settlement, prairies covered between 700 and 1500 square miles within the borders of present-day Ohio (Cusick and Troutman, 1978). Now, only small isolated fragments exist. Because these areas are of interest to naturalists, surviving prairie remnants are well known and studied. The absence of records of *Cuscuta glomerata* in Ohio from 1933 to 1989, despite its conspicuous appearance, utilization of common host species, and occurrence in frequently studied habitats, suggests that ecological conditions necessary for the growth of Rope-dodder were lacking during this period. At least some species in the genus *Cuscuta* have hard, impermeable seed coats which allow for an extended period of dormancy, and scarification or acid treatments have been necessary in laboratory conditions to induce germination (Tingey and Allred, 1961). It is possible that heat, such as

is generated by prairie fires, may rupture seed coats and stimulate germination. The recent records of this species correspond with the re-introduction of fire into Ohio's prairie ecosystems by natural-areas managers. Since all extant Ohio populations of *Cuscuta glomerata* have appeared in areas recently burned, it appears fire may be essential to the stimulation and growth of Rope-dodder in Ohio prairies.

Voucher specimens of *Cuscuta glomerata* collected as part of this survey have been deposited in the following herbaria: CLM, KE, MICH, MU, NY, and OS (Holmgren et al., 1990).

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